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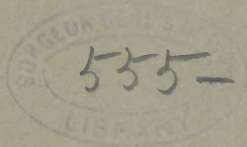
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Catheterism of the Ureters in the
Male and in the Female

WITH THE HELP OF CASPER'S
URETER CYSTOSCOPE.

BY
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CATHETERISM OF THE URETERS
IN THE MALE AND IN THE FEMALE
WITH THE HELP OF
CASPER'S URETER CYSTOSCOPE.*

By WILLY MEYER, M. D.

SINCE Nitze's new, simple, and handy cystoscope has been in use (since 1887), every cystoscopist has hoped for and expected a new instrument constructed according to the same pattern for catheterism of the ureters.

In my treatise *On Cystoscopy*, in *A System of Genito-urinary Diseases, Syphilology, and Dermatology*, edited by Dr. Prince A. Morrow, vol. i, page 449,† I stated the uselessness of Brenner's and Boisseau du Rocher's cystoscopes, until then the only ones designed for this purpose, both of which I had tried myself, and laid down my own ideas with reference to solving this task from a mechanical standpoint. I also explained why we could not attempt to make the instrument here.‡

* Read before the Section in General Surgery of the New York Academy of Medicine, November 11, 1895.

† New York: D. Appleton & Co., 1893.

‡ *Ibid.*, p. 489.

That the cystoscope for catheterizing the ureters of *both* sexes had to be constructed according to the principles originally laid down by Nitze, was always to my mind a matter of fact. No other instrument can bring more easily and more thoroughly into view the base of the bladder, and with it the ureteral openings. To see and approach the latter is, of course, the *sine qua non* in this kind of work.

It is greatly to be regretted that Nitze's inventive faculty began to apply his cystoscope for the "treatment" of bladder diseases (operative cystoscopy) before he had entirely exhausted the diagnostic side of its usefulness. Thus it happened that others undertook the task which, by virtue of Nitze's former ingenious inventions in this field, should have been accomplished by him.*

On January 9, 1895, Dr. L. Casper, of Berlin, presented his new ureter cystoscope to the Berlin Medical Society, demonstrating its practical use on two men.† In the discussion following his demonstration Nitze claimed priority for this instrument. He asserted that Casper had seen his (Nitze's) cystoscope before starting to make one of his own design. Casper strongly and repeatedly objected to this statement. To enter into this rather fervent controversy‡ would be futile. The profession no doubt owes thanks to Dr. Casper for his efforts in perfecting a cystoscope that permits of catheterizing the ureters with comparative ease, and *in bringing it into the market*. That which Nitze stated had been used by himself for years and had been demonstrated by him before the International

* According to Nitze—Zum Katheterismus der Harnleiter beim Manne, *Centralblatt für Chirurgie*, 1895, No. 9—he really was the first who succeeded in constructing a ureter cystoscope.

† *Dtsch. med. Woch.*, 1895, No. 7.

‡ See *Centralblatt für Chirurgie*, 1895, Nos. 9, 11, 14, 19, and 26.

Medical Congress at Rome in 1893, the meeting of German Naturalists and Physicians at Vienna in 1894, and the Congress of the German Surgical Society at Berlin in 1894, is so far nowhere for sale. Thus it seems that we have a right to call *this* new important instrument "Casper's ureter cystoscope"

Its new features, in comparison with the Nitze cystoscope No. 1, are :

1. The shank of the cystoscope (see figure) carries a straight groove, which can be transformed into a canal with the help of a movable lid (Li.) with a handle (H.). It is to receive the ureter catheter (U. C.). The outer end of this canal (O. E.) projects over a semicircular hard-rubber plate (Pl.) which forms a convenient handle, and, being situated about an inch and a half away from the ocular end of the telescope (O.), can easily be reached by the operator's hands. The vesical end, about six millimetres in front of the prism (Pr.), is worked out in such a way that the ureter catheter, emerging into the bladder, when pushed from the outside, forms with the shank of the cystoscope an angle of forty-five degrees. By this means we



are enabled to enter the ureteral orifice with great ease, as the vesical end of the ureter and the fundus of the bladder form an angle of about the same size. But the angle of forty-five degrees between the catheter and shank is produced only if the lid be pushed in as tightly as possible. The canal is situated on the concave side of the cystoscope, the one which carries prism and lamp (La.). This is a very wise arrangement, and decidedly distinguishes Casper's cystoscope from Brenner's and Boisseau du Rocher's. Both the latter carry the straight tube on the convex side, and, having no prism, force the cystoscopist to inspect the ureteral opening through a simple straight telescope. In order to do this the handle naturally has to be raised until it is almost vertical. For obvious reasons the result thus generally was very unsatisfactory. But in letting the catheter pass out right in front of the prism, its tip, somewhat magnified, always remains under the control of our eyes, and we handle the instrument just as we always use Nitze's cystoscope for the inspection of the fundus of the bladder.

2. The lamp is situated behind the prism in the longitudinal axis of the instrument—Lohnstein's modification (see figure). The other cystoscopes carry the lamp in the tip of the beak. Lohnstein alleges* for his modification the following special advantages over Nitze's original instrument:

(a) Foreign bodies in the bladder, larger stones, and tumors, that often have the tendency to fill out the concavity of the beak of Nitze's cystoscope, and will then not be seen on account of not being illuminated, can be nicely observed.

(b) Tumors situated at the side and above the internal urethral orifice will not escape the inspecting eye. These

* *Deutsche med. Wochenschrift*, 1895, No. 4, p. 59.

will generally not come into view by performing cystoscopy with Nitze's instrument No. 1.

(c) Beaks of different shape and length can be made and screwed on the instrument.

3. The beak of the instrument (B.) is made in one piece with that portion which carries the lamp.

The arrangements as described under Nos. 2 and 3 permit of shaping the beak according to necessity (hypertrophy of the prostate, etc.). Patients will thus more rarely experience the slight burning sensation if the tip of the beak should touch the fundus.

4. If the lid that covers the canal be pulled out, a straight metal mandrel (M.) can be inserted into the groove. By doing this the small catheter which had been pushed through the canal into the ureter is lifted out of the groove and thus liberated. Now the cystoscope can be withdrawn, while the catheter remains *in situ*. The latter is an English web catheter of No. 4 French gauge. It is sixty centimetres (twenty-three inches and a half) long. A long thin wire mandrel obstructs its lumen up to about two inches from its tip.* The catheter is flexible, yet has sufficient stiffness to enter the vesical end of the ureters and to pass upward to the pelvis of the kidney if gently pushed from the outside.

5. The ocular lens of the telescope is not in the same axis with the other lenses. It is moved to a place two centimetres below the canal described above under No. 1. This is done to enable the cystoscopist to handle the lid of the canal and the steel mandrel with convenience and ease, and to push forward the ureter catheter or its substitutes in a straight line. The picture is reflected to the ocular

* In the newest pattern (December, 1895) the mandrel fills the lumen in its entire length, and the outer end of the catheter is funnel-shaped.

lens with the help of a double prism. The view of the interior of the bladder is nevertheless just as brilliant and satisfactory as when it is seen through the other cystoscopes.

The shape of the shank is oval, not round; its size, No. 24 French gauge. It passes a urethra of this dimension without difficulty. The electric current is conveyed to the instrument by slipping a doubly perforated semicircular hard-rubber plate over two projecting wires, which are fastened on the hard-rubber handle of the instrument (+ and -). A screw (S.) makes and breaks the current. The cystoscope is manufactured by W. A. Hirschmann, Berlin, N. Germany.*

Until January 9th, the date of reading his article before the Berlin Medical Society, Casper succeeded in catheterizing the ureters with this instrument thirty times in twenty-two patients. Of these, twenty-one were men. He failed in accomplishing his purpose only once. The majority of the patients were afflicted with chronic gonorrhœa, a small number had cystitis, one had hypertrophy of the prostate. Two of Casper's assistants also found no difficulty in using the new cystoscope.

My personal experience is so far (November, 1895) based on only three patients, one male and two female. In these I have catheterized both ureters simultaneously—*i. e.*, six times in all. I have been in possession of this instrument for a very short time, and have used it in my private practice according to strict indication only. In a fourth patient, a gentleman of Brooklyn, who had vesical catarrh and probably unilateral nephrolithiasis, in whom I tried to catheterize the ureters five days ago, I did not succeed in finding the ureteral openings. I had clearly seen them and had been able to demonstrate them to his brother, who is a

* It is for sale in New York by Messrs. R. Kny & Co., 17 Park Place. Price, \$45.

physician, five days before this attempt, on inspecting his bladder with the ordinary cystoscope. The trigonum and fundus were at the last examination injected and the tiny apertures thus rendered too indistinct. It would be incorrect to call this attempt a failure. We necessarily must find the mouth of the ureters before we can enter them with an instrument. The vesical catarrh of this patient is now being carefully treated, and I hope soon to be able to enter the ureters with the same ease as I did in my first male patient.*

Since reading this paper I have had occasion to catheterize the ureters of one more lady and four more men, in all instances successfully. One of the patients had a marked hypertrophy of the prostate. To my surprise, I did not find the procedure difficult at all. On the contrary, it impressed me as being easier than in patients whose prostate had the normal size. Thus I have succeeded in catheterizing the ureters with the new instrument, in all so far, sixteen times—six times in female and ten times in male patients. I consider the procedure an easy one, and believe that it will always be successful where the bladder will hold from five to six ounces of fluid, and where the mouth of the ureters can be well seen and approached.

In performing catheterism of the ureters with Casper's instrument in patients who need this examination, I should advise, provided the three cardinal conditions for employing cystoscopy are fulfilled,† to proceed as follows:

1. Wash and cocainize the bladder according to well-known rules.‡
2. Fill the bladder with from five to seven ounces of

* Meanwhile the patient has gone on a trip to Japan. Before his departure I had no opportunity to perform the examination.

† See author, in Morrow's *Handbook*, vol. i, p. 455.

‡ *Ibid.*, p. 456.

clear fluid. It is necessary to inject a little more than the usual average amount for a cystoscopic examination—viz., five ounces—because there is some continuous leakage alongside the ureter catheter. Of course the latter can not fit in the canal as snugly as a mandrel does; it has to remain freely movable. Consequently there must be leakage, as the intravesical pressure is greater than the atmospheric. The fluid in the bladder is therefore slowly ebbing away. By placing the patient in Trendelenburg's posture of about twenty-five degrees during the examination, we can reduce this leakage a good deal; also by slipping over the external entrance to the canal a short rubber tube of very small calibre, just large enough to permit of moving the ureter catheter. Until the ureteral openings have been found this tube should be well pressed against the catheter. A simple sling of a thread will also suffice. On the other hand, it is not wise to fill the bladder with too much fluid.* Six ounces should be the average amount. A beginner may probably do well, in order to save time and to succeed, first to use the ordinary cystoscope for ascertaining the situation of the mouth of the ureters and then to introduce the ureter cystoscope.

3. Push the ureter catheter down to the internal opening of the canal, the lid of the latter being well in place; introduce the instrument.

4. As soon as the interior of the bladder has been satisfactorily inspected and the ureteral openings have come into view, approach one of them.† A trained cystoscopist

* Lately I have succeeded in catheterizing both ureters of a man whose bladder then held 650 c. c. (equal to a pint and a quarter). In another man I accomplished the purpose with 300 c. c. (equal to ten ounces) in the bladder. In both cases it was not so easy as in my other cases, where from five to seven ounces had been injected.

† It will be, I think, a good plan first to collect the urine discharged by the kidney presumably diseased. We are not always sure of being

knows how to do this. He slightly raises the handle of the instrument and carries it over to the opposite side of the patient, at the same time pushing it in a little or pulling it out until the orifice is in the focus. By bringing the prism as near to it as possible, we greatly magnify the tiny hole, and can observe in a beautifully clear manner how the catheter becomes engaged in the opening, and, if pushed from outside, passes on and on.

I have found it practicable to pull out the lid a little, say a quarter of an inch, before pushing the catheter out of the canal into the bladder. Its rather delicate tip is thus better preserved, and not roughened by the borders of the narrow hole.

The lid must then *at once* be pushed back into place. As mentioned above, this is absolutely necessary in order to let the catheter emerge at an angle of forty-five degrees. If this rule is not adhered to the catheter will not enter the ureter, no matter how we may turn or push or pull the cystoscope.

5. Catheterism of the ureter having been successful, the wire mandrel is withdrawn from the catheter.* Urine generally at once begins to flow, drop by drop, at intervals.† I should strongly advise always to withdraw the

able to collect the urine of both kidneys in one sitting, especially in the male, if, for instance, the bladder is irritable.

* The thumb and index finger of the left hand must fix the catheter for this purpose in front of the outer opening of the channel; otherwise the catheter might be pulled out of the ureter.

† I have found it advisable not to save the very first drops. They often appear brown, or even red, on account of slight admixture with blood. In spite of very gentle handling, we shall not prevent injuring the delicate superficial layer of the epithelial cells of the ureter, and sometimes causing minute hæmorrhage. This, however, rapidly ceases. In two of my cases the flow of urine was not interrupted, according to the ureteral jets as seen through the cystoscope, and corresponding with the contractions of the ureter. It was almost continuous.

mandrel as soon as the catheter has entered the lower end of the ureter for about one to two inches: this to find out, as long as the cystoscope is in the bladder, whether the lumen of the catheter is not obstructed. As soon as the urine flows, one glance through the instrument will tell us whether the catheter is in its proper place. If we push the catheter farther up toward the pelvis of the kidney and lift it out of the canal, pull out the cystoscope and *then* withdraw the mandrel, our entire procedure may prove to be a failure. In one of my last cases—the gentleman with hypertrophy of the prostate—I made this mistake. I had gathered about eight cubic centimetres of urine from the right (presumably diseased) kidney. Having entered the left ureter, I wanted to save the patient the little annoyance of the further presence of the cystoscope. I pushed the catheter quickly up toward the kidney for about twenty-five centimetres, liberated it, and removed the cystoscope. Now I pulled out the mandrel. No urine escaped. I pulled and pushed the catheter, and aspirated with a powerful syringe: no urine. I pulled the eye of the catheter down into the lower third of the ureter and waited: no urine. I then injected a few drops of a sterilized saline solution, in order to clean the tiny lumen of the catheter which might have become clogged. As I had expected, a vehement renal colic was the result. But not a drop of urine appeared. I had to remove the catheter entirely, and now learned to my disgust that the tip of the catheter had bent a little at the eye, and that within the latter a small shred of coagulated blood had been caught. In spite of a perfectly successful catheterism of both ureters the whole procedure thus was, in part at least, a failure. I had the urine of the

In one patient, whose one (healthy) kidney discharged a hundred and fifty drops in four minutes, I had ordered a larger amount of fluid internally before the examination was performed.

right kidney (probably the diseased one) only, and none from the left for comparison. The patient's condition did not admit of my introducing the cystoscope again and catheterizing the left ureter for a second time. Had I carried out what I had always done before and have advised above—viz., withdrawn the mandrel as soon as the eye of the catheter was well within the ureter, and had I then found out that the urine did not flow—I might very easily have changed the catheter, leaving the cystoscope *in situ*. If urine drops out of the catheter it is best collected in a small test tube, marked right or left according to the side which is catheterized. The average amount is from eight to ten cubic centimetres in about ten minutes. But the quantity may be materially smaller within that time.*

It is of importance to know how much urine is absolutely needed for a scientific analysis of the same. According to Dr. Frederick E. Sondern, of this city, the gentleman who does all the examinations of urine for me in his laboratory, six cubic centimetres is the smallest quantity which permits of a thorough chemical and microscopical examination. Of course the centrifuge is here of the greatest value.

During the collection of the urine the cystoscope with the catheter may be left *in situ*. Then one will, of course, turn off the light and support the handle outside. If this

* In such an instance either the kidney secretes less urine at the time, or we have to presume that not all the urine passes through the catheter, but that some runs alongside the same. In such a case it is advisable to move the catheter a little. Thus, a fold of the ureteral mucous membrane, which happened to occlude entirely or partially the eye of the catheter, will be pushed aside, or the latter drawn away from it. If after a while no urine appears at the outer end of the catheter, aspiration with a powerful syringe will often be found very useful. As mentioned above, the newest Berlin ureter catheters are funnel-shaped at the end—a great improvement, as it makes aspiration very easy.

is not wanted, the lid is withdrawn from the canal and the steel mandrel pushed into it, thus lifting the catheter out of its bed. In the female patient we may now, after extracting the mandrel, replace the lid and refill the bladder through the canal with the help of a syringe without removing the cystoscope, introduce another ureter catheter, and drain the opposite kidney; then remove the cystoscope and leave both catheters in place. In the male, especially in one who has a rather narrow urethra, this is not so easy. The cystoscope can not be turned well within the urethra if even a small catheter passes through it. Here we had better catheterize one side after the other—*i. e.*, either introduce the cystoscope twice, or refill the bladder through the canal after a sufficient amount of urine has been collected from the one kidney, and then catheterize the opposite side. This means leaving the cystoscope in the bladder for about twenty to twenty-five minutes. I have repeatedly satisfied myself that a bladder which is not irritable stands this very well.

I fear I have given you a rather lengthy description of the procedure. I have done so because I thought others might profit from the experience I have had thus far in practice. You may even have thought that the procedure was specially troublesome and time-robbing; but this is by no means the case. I can assure you it does not take so long to catheterize a ureter, in a suitable male patient, as it has just taken me to read this description. I purposely say in the male, because in the female it is still easier. The work itself is most interesting. Not in years have I felt such a real satisfaction as when I succeeded on October 25th for the first time in draining each kidney of a man separately, without any previous cutting operation. We can, of course, not expect success in every instance. We must be able:

1. To perform cystoscopy (and cystoscopy itself has its limitations).

2. To approach the mouth of the ureters.

It is often difficult to find the ureters, on account of their small size. Not unfrequently they are drawn aside by intravesical pathological changes, or they are covered by hypertrophied rugæ. The operator will, however, with increased dexterity and experience, find them in most instances. I can conscientiously state that I recollect only a few instances in my cystoscopic work of the last eight years where I searched in vain for the ureteral openings and jets of urine. I simply inspect the fundus of the bladder until I have found them. The internal urethral orifice, also the intra-ureteral bar, are important landmarks for this purpose. The intermittent protruding and receding of the region where the ureteral openings are situated is also a great help in finding them.

It may be of interest to add that the manipulations within the ureteral canal itself are void of special pain, a fact which is well known to those who do ureteral work according to Kelly's method. One can push the flexible catheter up to the renal pelvis. The patient has no more annoying sensations than a catheter produces that is introduced into the bladder. Casper found that if a non-irritant fluid was injected into the lower portion of the ureter, colicky pains set in; if, however, it was injected into the upper part with gentle pressure, one could safely irrigate the pelvis of the kidney. The patient then has hardly any pain. Casper professes to have cured two patients with ascending suppurative (gonorrhœal) pyelitis by repeatedly irrigating the pelvis of the kidney with a nitrate-of-silver solution.

In comparing this newest method of catheterizing the ureters with former useful ones, only Kelly's comes into consideration. I need not tell the members of this section

of the great scientific and practical value of the same. Yet it can be applied in the female only. I am absolutely convinced that, with the help of straight metal tubes as necessarily used by Kelly, we shall never succeed in satisfactorily catheterizing the ureters of a number of male patients. In exceptional cases it may be feasible; but the method must be far inferior to the one just described. As stated above, the straight tube has also made Brenner's and Boisseau du Rocher's cystoscope a practical failure.

For ureteral work in the female I prefer Kelly's method. I do not like to say that it is easier, for there can not be anything simpler for a trained cystoscopist than to work successfully with Casper's instrument. I believe even that in cases where we fail with Kelly's method we may often succeed with Casper's. But Kelly's procedure gives more satisfaction to the surgeon, because it can actually be carried out aseptically. His instruments can all be sterilized. None of the cystoscopes can be boiled except the French one, and this, unluckily, is the least useful. We have, to satisfy ourselves, to disinfect the instrument according to *antiseptic* rules, by carefully washing and irrigating and rubbing it after use with a five-per-cent. carbolic solution, and afterward with sterilized water, and immersing it in a five-per-cent. carbolic solution for an hour before trying it for the next patient. The small ureteral catheter, though, can be boiled a number of times without injuring it.

It is to be hoped that the cement which holds the prism in place in the cystoscopes built according to Nitze's principles, the only part which does not stand boiling, will in the future be prepared in such a way that it will answer this demand. This would naturally greatly increase the value of the instrument in a surgical sense, according to modern views. In considering this point we ought not to forget, however, that attempts at manufacturing flexible catheters

that will stand sterilization by boiling are of very recent date and have been only partially successful. And flexible catheters have been used by doctors up to date without previous boiling, and, by a careful man, almost always without detriment to the patient. I can conscientiously state that I remember a very few cases only where prolonged cystoscopy produced an irritable bladder. Where it has happened, the bladder had always been the seat of an inflammation before. For the last four years I have always carefully washed the posterior urethra and the bladder once more immediately after cystoscopy, and let the patient take ten grains of quinine on reaching home. Since strictly adhering to this precaution I have not observed a single case of instrumental cystitis.

The construction of Casper's instrument has in this way at last really completed the diagnostic capability of the cystoscope from a mechanical standpoint. Catheterism of the ureters will now, in the male also, be an extremely important and never-to-be-omitted factor in cystoscopy for renal disease.

Thus, Mr. Chairman and gentlemen, we can to-day safely state it as a fact that the problem of conveniently catheterizing the ureters in the male, as well as in the female, without a previous cutting operation—in other words, the problem of the “bloodless, separate collection and analyzation of the secretion of each kidney in both sexes”—is now actually solved.

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EDITED BY

FRANK P. FOSTER, M.D.

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